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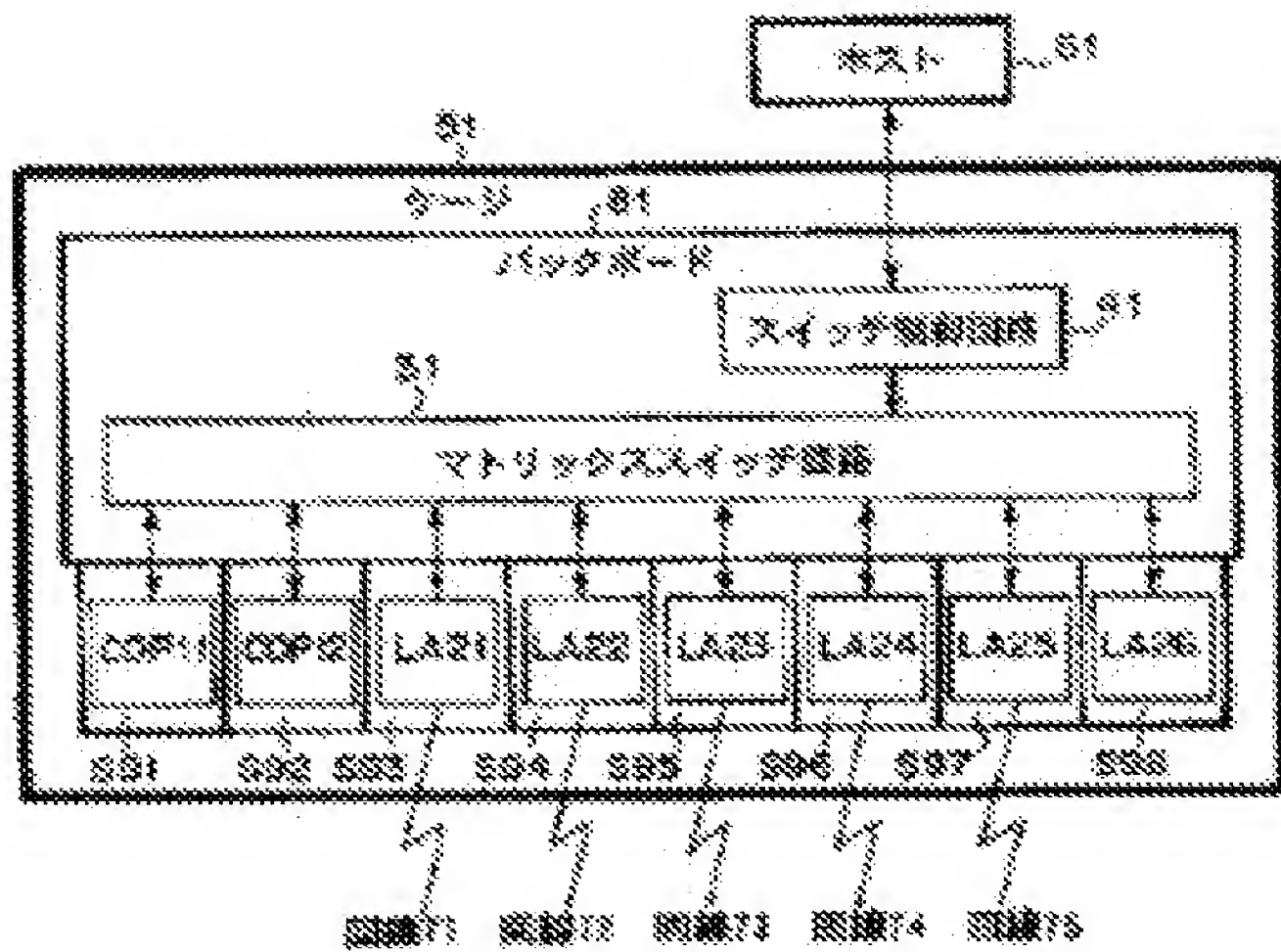
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Abstract:

PROBLEM TO BE SOLVED: To turn a line adapter(LA) under the control of a control processor (COP) into operable state without turning off the power source of a system while unnecessitating the exchange of a board even when any fault occurs in the LA. SOLUTION: Concerning the communication control unit with plural packaged function boards, a board for COP, a board for LA and a backboard for packaging the respective boards are provided as these boards, the backboard is provided with a matrix switch circuit for switching a connection with the respective boards and a switch control circuit connected to a host for controlling the matrix switch circuit, and the matrix switch circuit comprises a matrix for switching the board for COP and plural boards for LA controlled by the board for COP.



(57) Abstract

Means for SolutionIn a communication control unit equipped with two or more function boards, on said board, a board for control processors, Have a board for line adapters, and a backboard equipped with said each board, and to the above-mentioned backboard. A matrix switch circuit which switches connection with said each board, and a switch control circuit which is connected to a host and controls said matrix switch circuit are provided, A matrix switch circuit constitutes a matrix for a switch of said board for control processors, and two or more boards for line adapters controlled by said board for control processors.

Claim 1. It has the following and is characterized by said matrix switch circuit consisting of a matrix for a switch which switches in matrix said board for control processors, and said two or more boards for line adapters controlled by said board for control processors. A communication control unit equipped with two or more function boards.

A matrix switch circuit which is provided with a board for line adapters, and a backboard equipped with said each board, and switches connection with said each board to the above-mentioned backboard.

Claim 2 In the communication control unit according to claim 1, said switch control circuit, When injury occurs in one of said the boards for line adapters, A communication control unit switching a switch of said matrix so that said board for line adapters connected with said board for control processors of said matrix switch circuit may be connected with other boards for line adapters.

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to which the board for control processors concerned was connected from said board for control processors is sent out, A communication control unit characterized by switching matrix form voice of said matrix switch circuit by said switch control circuit when an obstacle occurs.

Claim 4In the communication control unit according to claim 1, to the above-mentioned backboard. By the monitor which was provided with a monitoring circuit which monitors a signal which is connected to said switch control circuit and flows into said matrix switch circuit, and was connected to the monitoring circuit concerned. A communication control unit monitoring a switch state of said said matrix switch circuit.

Claim 5In the communication control unit according to claim 2, a board for line adapters besides the above is a spare board for line adapters, When an obstacle occurs on said one of boards for line adapters, said host is notified of said injury from said board for control processors, Said host searches whether it is usable in a board for line adapters of said reserve via said switch control circuit, Stop operation of said board for control processors, and connection changing of the line cable of said board for line adapters which generated said injury is carried out to a board for line adapters of said reserve, A communication control unit carrying out connection changing to said board for control processors of said matrix switch circuit, and a board for line adapters of said reserve via said switch control circuit with software.

Detailed Description of the Invention

0001

Field of the InventionThis invention relates to the communication control unit which controls connection with the board for control processors and the board for line adapters which mainly have CPU about the communication control unit which controls connection of two or more boards used for a communication apparatus.

0002

Description of the Prior ArtIn recent years, plant-and-equipment investment also increases for B-ISDN according to development of the Internet etc., or growing gigantic of data-communications capacity, optical-fiber-izing of a public line, etc., and equipment of communication apparatus, such as a switchboard and a relay aircraft, is becoming an important element. As for this communication apparatus, it is actual tens of pieces or to insert hundreds of pieces and to exhibit switching functions, such as an ATM network, a public network, a basic system line network, for the board which has a predetermined function in the big rack. To networks in a company, such as LAN and WAN, the network in PBX, etc. The actual condition is the switching function and switching of a switchboard or a switcher being needed when sent out towards a destination address from a transmitting agency, and inserting two or more boards in a rack, and exhibiting the predetermined function. In that case, by a switchboard, the board provided with CPU is prepared, and all together, the control system in a rack is borne and may be operated. Each telephones may be equipped with a junction circuit board, and it may have a board for VPN (Virtual Private Network), a dedicated line, the basic system channel for other addressing to a switchboard, etc. In that case, exchange of a board is needed for **the case where once setting out and the board with which it equipped break down, and for a functional change etc.** the future increase in equipment.

0003Generally a communication control unit (it is hereafter called CCU:Communication Control Unit), It comprises a line adapter (it is hereafter called LA:Line Adapter) which controls a communication line, and a control processor (it is hereafter called COP:Control Processor) which controls the LA.

0004The line interface is provided in LA.

Usually, two or more LA control is possible for COP per sheet.

CCU needs the processor board per communications protocol in order to use different firmware for every communications protocol. This COP of one sheet and that subordinate's LA are generically called CCU. One set of a host computer is connectable with two or more CCU.

0005The mounting method of a CCU board is mounted in the cage which comprised a slot and a backboard inside device casing. A slot is an insertion area for inserting a board, and if it is usually a board of identical shape, it can mount also by what slot physically. A backboard is a thing for connecting the signal between the boards inserted in each slot.

0006The CCU mounting method to a concrete cage is mounted by CCU1 or two units, as shown in drawing 6. According to drawing 6, if the cage 51 is equipped with the backboard 81 provided with the RESEKU tuple or connector which inserts the connector of a board board and the example of a mounting method is shown, COP11 (S91) is mounted to the leftmost part of CCU,

and it mounts by making LA21 (S92) of the subordinate adjoin the right-hand. In mounting two or more LA, it mounts by making the right-hand side adjoin in order so that LA 22 (S93) and 23 (S94) may be mounted continuously. If 1 set of CCU1 can be mounted, the following CCU2 will be mounted in the same procedure and it will go. COP21 (S95) is mounted in CCU2 and LA24 (S96) of the subordinate and LA25 (S97) are mounted in the right-hand side. It is connected to each LA, respectively and the circuits 1 thru/or 5 transmit each other to it with an external translator and the communication control unit of a switchboard.

0007If its attention is paid about the portion of the backboard 81 between LA23 to LA24 as the structure as shown in drawing 7, Inside LA, in order to connect a signal to LA on the right for the input output signal from COP12 side (left-hand side), the pin from COP12 side (left-hand side) and the pin by the side of LA24 (right-hand side) are connected inside. COP12 outputs **COP12 does not connect the input output signal from left-hand side to LA24 side (right-hand side) to it, but** and inputs a signal for an input output signal only to the subordinate's LA24 side (right-hand side). Influence is not received in the signal from other CCU which is in left-hand side by this, but input and output of a signal are attained only at their subordinate's LA 23 and 24. **in right-hand side**

0008

Problem(s) to be Solved by the InventionHowever, this method has a fault. It is carried out on condition that all of COP and LA which are connected into the same CCU as the fault mount without an empty slot, and when an empty slot arises, access of all the adapters mounted in the right-hand side becomes impossible. When LA board breaks down temporarily, it is necessary to turn OFF the power supply of the whole system at the time of board exchange, and to exchange boards in the present composition. be temporary in a general purpose computer --also in other functions, turning OFF a power supply will have great influence. When adding LA board by extension of LA, etc., it is necessary to remount all the CCU boards mounted in the right-hand side to right-hand side, and there is a problem that working efficiency is very bad.

0009Then, the main purposes of this invention have unnecessary exchange of a board, even if failure occurs in LA, and they change a COP subordinate's LA into the state where it can operate, without turning off the power supply of a system.

0010

Means for Solving the ProblemIn a communication control unit which equips with two or more function boards in order that this invention may attain the above-mentioned purpose, Equip said board with a board for control processors, and a board for line adapters and a backboard equipped with said each board, and to the above-mentioned backboard. A matrix switch circuit which switches connection with said each board, and a switch control circuit which is connected to a host and controls said matrix switch circuit are provided, A matrix switch circuit constitutes a matrix for a switch of said board for control processors, and two or more boards for line adapters controlled by said board for control processors.

0011In the above-mentioned communication control unit, a board for line adapters besides the above is a spare board for line adapters, When an obstacle occurs on said one of boards for line adapters, said host is notified of said injury from said board for control processors, Said host searches whether it is usable in a board for line adapters of said reserve via said switch control circuit, Stop operation of said board for control processors, and connection changing of the line cable of said board for line adapters which generated said injury is carried out to a board for line adapters of said reserve, Connection changing is carried out to said board for control processors of said matrix switch circuit, and a board for line adapters of said reserve via said switch control circuit with software.

0012In signal connection between a board (COP) for control processors in a communication control unit, and a board for line adapters (LA), this invention is characterized by providing on a backboard a matrix switch circuit and a switch control circuit which controls it. Unlike a bus connection method which has restriction in the conventional mounting position, by providing those circuits, it is characterized by the ability to free mounting of COP or LA.

0013If it explains this invention referring to drawing 1, it shows a block diagram using the matrix switch circuit 31 and the switch control circuit 41. It is using the matrix switch circuit 31 and the switch control circuit 41, and this function was setting out from the host 61, it controlled the switch control circuit 41 and the matrix switch circuit 31, and enabled free bus signal connection between COP 11-12 and the subordinate's LA 21-26.

0014

Embodiment of the InventionThe embodiment of this invention is described in detail,

referring to drawings.

0015A 1st embodiment

(1) The block diagram of the switching circuit in the communication control unit as a 1st embodiment is shown in the explanatory view 1 of composition. Here, the case where the slot only for **the slot only for a control processor (COP)** S91-S92, and a line adapter (LA) is set to S93-S98 is explained to the cage 51. Actually, the number of COP can use this embodiment, if the number of one or more and LA is two or more.

0016COP 11-12 is mounted to the COP dedicated slots S91-S92, and LA 21-26 is mounted to the slots S93-S98 for LA mounting. However, LA26 shall be used as the board for reserves here, a circuit shall not be connected, and it shall not be used in an initial stage. From each CCU board, it is connected to the backboard 81 as a bus for input and output, respectively. The bus from each board is outputted and inputted in the matrix switch circuit 31 in the backboard 81, and switching of a bus is performed in this matrix switch circuit 31. Switching of a bus performs the bus from some COP dedicated slots S91-S92, and the bus connection to some LA dedicated slots S93-S98, and the connection is made by the switch control circuit 41 in the backboard 81. The switch control circuit 41 can also check the connected state of the matrix switch circuit 31, and can notify the host 61 of a switching state depending on the demand from the host 61. In initial setting, a switching demand is performed from the host 61 to the switch control circuit 41, and the switch control circuit 41 switches to the matrix switch circuit 31.

0017The matrix switch circuit 31 consists of a relay switch, a MOS switch of a solid state switch, etc., and the switch control circuit 41 is connected to the control terminal of each switch here, and with the control signal from a host. The connected state of said matrix switch circuit 31 can be appropriately changed via the switch control circuit 41.

0018As this embodiment, as the combination of COP11 (S91)-COP12 (S92), and LA21 (S93)-LA26 (S98) is shown, for example in drawing 2 with the gestalt of arborescence. To COP11 from the host 61, it is possible to connect LA 24-25 to connection and COP12, and LA26 makes LA 21-23 a reserve in this example.

0019The block diagram of the matrix switch circuit 31 on the backboard 81 is shown in drawing 3. In order to make a figure intelligible, COP 11-12 is shown perpendicularly, and it shows LA 21-26 horizontally, and shows the state where it was connected to the matrix switch, respectively. The matrix switch forms MOSFET of three terminals, the bipolar transistor, the relay, etc. at the cross point of the matrix, connects the control terminal to the switch control circuit 41, and the switch control circuit 41 controls the matrix switch circuit 31. If the switch control circuit 41 stores the high of voltage, and the low in the register or the flag for example, it is controlling it, it will monitor the state of the matrix switch circuit 31.

0020According to drawing 3, LA 24-25 is connected to LA 21-23 and COP12 the actual condition and COP11. To the matrix switch circuit 31, it carries out possible **of the connection on a lattice** by setting out from the switch control circuit 41. Here, a black dot shows a lattice-like connected part.

0021(2) Below explanation of operation explains per operation of this embodiment. Here, it explains using the flow chart of ***** drawing 4 of LA failure occurrence of operation. Here, the case where failure occurs is temporarily explained to LA23.

0022In Step T1, if failure usually occurs in LA, a certain phenomenon will occur. Next, in Step T2, if failure occurs in LA23, COP11 diagnoses to LA23, and an error will be made to the host 61 and it will notify him of the contents. In T3, a user checks the error content of LA of which the host was notified, and judges whether it is that to which the contents depend on failure of hardware. In Step T4, since exchange of the LA23 is needed when a user judges it as failure of LA23 here, it is checked whether it is usable in LA26 board for substitution already mounted in reserves. This check is a check of whether LA26 for reserves is already used for other COP. In this case, as a substitute of other LA failures, when LA26 is used, substitution already becomes impossible.

0023Next, in Step T5, if use of the alternative board of this LA26 is possible, a user will stop COP11 and that subordinate's operation of LA21-LA23 first. After a stop is completed, the cable for circuits connected to the circuit is removed from LA23, and the cable of the circuit 73 is connected to LA26. In T6, with software etc., a user separates connection of COP11 and LA23, and performs the connections set of COP11 and LA26. The switch control circuit 41 switches the contents set up there to the matrix switch circuit 31. If switching is completed, a user will start operation of COP11 and the subordinate's LA 21-22, and 26.

0024By the above-mentioned embodiment, when failure occurred in LA23, COP11 detected the failure and the example of which the host 61 is notified was shown, but it may be set as the

program target which scans **whether each LA in a device broke down, and** to LA by COP11 for every constant interval. A constant interval is made into 1 or less second, and if it judges that the LA is out of order and the host 61 is notified when the scan also sends out an acknowledge signal to each LA and does not have the answer, it can switch to surplus LA for failure at an early stage, rather than switching, after LA breaks down. Since failure is detectable in the state whether failure occurs or not, early convalescence of the data communications of a circuit can be planned.

0025A 2nd embodiment Next, a 2nd embodiment of this invention is described with reference to drawings.

0026Reference of drawing 5 forms the monitor 102 out of the monitoring circuit 101 and the cage 51 on the backboard 81. In order to know the switching state of a communication control unit (CCU), had to check from the host 61 specially, but. It becomes possible by inputting the output signal from the switch control circuit 41 into the monitoring circuit 101, and displaying it by the monitor 102 to always check a switch state.

0027COP11, LA21, LA22, and LA23 are connected so that the switch control circuit 41 may be shown in the state of the matrix switch circuit 31, for example, drawing 3, Since it can recognize having connected COP12, LA24, and LA25 with the service voltage to control terminals, such as MOSFET provided at the cross point of the matrix switch circuit 31, That service voltage is stored in the register etc. which are built in separately in the bit of "0" and "1", the state of a register equivalent to this state where it is connected is read, and the state of each cross point is outputted to the monitoring circuit 101.

0028The monitoring circuit 101 has an image processing function, and generates the pattern which can express the state of a matrix switch itself in a picture as a picture signal, It generates in the similar manner as a picture signal which displays the switch of the point that LA21 and LA22 to COP11 and COP12, and LA26 cross, with ON-and-OFF numerals. Or it is good also as a display which distinguished the line which makes a thick line the line through which it flows in the matrix form voice of X-Y, and has not flowed through it as a small-gage wire. The monitor 102 consists of a cathode-ray tube, a liquid crystal panel, and a display panel as which any of a plasma display panel may be sufficient, expresses the picture signal generated in the monitoring circuit 101, and enables it to recognize visually the switch/on/off state of the matrix switch circuit 31. The light may be switched on in spot and the change state which can be visually recognized whenever it changes under control of the matrix switch circuit 31 of the switch control circuit 41 may be displayed.

0029The output signal from the switch control circuit 41 may be a control signal from the host 61, or may be a signal which is pointing to the matrix form voice of the matrix switch circuit 31 from the switch control circuit 41.

0030In addition to the effect of a 1st embodiment, this embodiment has the effect that the switching state of a communication control unit (CCU) can be checked visually, without using the host 61.

0031

Effect of the InventionSince according to the switching circuit of the communication control unit of this invention connection between COP and LA can be freely changed by mounting spare LA board start **the system** , The board change between COP and LA is attained without turning off the power supply of a system.

0032when extending LA board, the actual condition and other CCU boards are not moved -- take, although there was a case where there was nothing, Since this invention can substitute it as an extension board by mounting spare LA board, even if it does not change mounting of other CCU boards, mounting of an extension board is attained and reduction of a great working man hour is attained.

0033If it switches and equips with every one LA board of a new version even case **like upgrade of LA board** , even if it does not drop a power supply, it can equip one by one.

Field of the InventionThis invention relates to the communication control unit which controls connection with the board for control processors and the board for line adapters which mainly have CPU about the communication control unit which controls connection of two or more boards used for a communication apparatus.

Description of the Prior ArtIn recent years, plant-and-equipment investment also increases for B-ISDN according to development of the Internet etc., or growing gigantic of data-communications capacity, optical-fiber-izing of a public line, etc., and equipment of communication apparatus, such as a switchboard and a relay aircraft, is becoming an important element. As for this communication apparatus, it is actual tens of pieces or to insert hundreds of pieces and to exhibit switching functions, such as an ATM network, a public network, a basic system line network, for the board which has a predetermined function in the big rack. To networks in a company, such as LAN and WAN, the network in PBX, etc. The actual condition is the switching function and switching of a switchboard or a switcher being needed when sent out towards a destination address from a transmitting agency, and inserting two or more boards in a rack, and exhibiting the predetermined function. In that case, by a switchboard, the board provided with CPU is prepared, and all together, the control system in a rack is borne and may be operated. Each telephones may be equipped with a junction circuit board, and it may have a board for VPN (Virtual Private Network), a dedicated line, the basic system channel for other addressing to a switchboard, etc. In that case, exchange of a board is needed for **the case where once setting out and the board with which it equipped break down, and for a functional change etc.** the future increase in equipment.

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0005The mounting method of a CCU board is mounted in the cage which comprised a slot and a backboard inside device casing. A slot is an insertion area for inserting a board, and if it is usually a board of identical shape, it can mount also by what slot physically. A backboard is a thing for connecting the signal between the boards inserted in each slot.

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0007If its attention is paid about the portion of the backboard 81 between LA23 to LA24 as the structure as shown in drawing 7, Inside LA, in order to connect a signal to LA on the right for the input output signal from COP12 side (left-hand side), the pin from COP12 side (left-hand side) and the pin by the side of LA24 (right-hand side) are connected inside. COP12 outputs

COP12 does not connect the input output signal from left-hand side to LA24 side (right-hand side) to it, but and inputs a signal for an input output signal only to the subordinate's LA24 side (right-hand side). Influence is not received in the signal from other CCU which is in left-hand side by this, but input and output of a signal are attained only at their subordinate's LA 23 and 24. **in right-hand side**

Effect of the InventionSince according to the switching circuit of the communication control unit of this invention connection between COP and LA can be freely changed by mounting spare LA board start **the system**, The board change between COP and LA is attained without turning off the power supply of a system.

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other CCU boards, mounting of an extension board is attained and reduction of a great working man hour is attained.

0033If it switches and equips with every one LA board of a new version even case **like upgrade of LA board** , even if it does not drop a power supply, it can equip one by one.

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0009Then, the main purposes of this invention have unnecessary exchange of a board, even if failure occurs in LA, and they change a COP subordinate's LA into the state where it can operate, without turning off the power supply of a system.

Means for Solving the ProblemIn a communication control unit which equips with two or more function boards in order that this invention may attain the above-mentioned purpose, Equip said board with a board for control processors, and a board for line adapters and a backboard equipped with said each board, and to the above-mentioned backboard. A matrix switch circuit which switches connection with said each board, and a switch control circuit which is connected to a host and controls said matrix switch circuit are provided, A matrix switch circuit constitutes a matrix for a switch of said board for control processors, and two or more boards for line adapters controlled by said board for control processors.

0011In the above-mentioned communication control unit, a board for line adapters besides the above is a spare board for line adapters, When an obstacle occurs on said one of boards for line adapters, said host is notified of said injury from said board for control processors, Said host searches whether it is usable in a board for line adapters of said reserve via said switch control circuit, Stop operation of said board for control processors, and connection changing of the line cable of said board for line adapters which generated said injury is carried out to a board for line adapters of said reserve, Connection changing is carried out to said board for control processors of said matrix switch circuit, and a board for line adapters of said reserve via said switch control circuit with software.

0012In signal connection between a board (COP) for control processors in a communication control unit, and a board for line adapters (LA), this invention is characterized by providing on a backboard a matrix switch circuit and a switch control circuit which controls it. Unlike a bus connection method which has restriction in the conventional mounting position, by providing those circuits, it is characterized by the ability to free mounting of COP or LA.

0013If it explains this invention referring to drawing 1, it shows a block diagram using the matrix switch circuit 31 and the switch control circuit 41. It is using the matrix switch circuit 31 and the switch control circuit 41, and this function was setting out from the host 61, it controlled the switch control circuit 41 and the matrix switch circuit 31, and enabled free bus signal connection between COP 11-12 and the subordinate's LA 21-26.

0014

Embodiment of the InventionThe embodiment of this invention is described in detail, referring to drawings.

0015A 1st embodiment

(1) The block diagram of the switching circuit in the communication control unit as a 1st embodiment is shown in the explanatory view 1 of composition. Here, the case where the slot only for **the slot only for a control processor (COP)** S91-S92, and a line adapter (LA) is set to S93-S98 is explained to the cage 51. Actually, the number of COP can use this embodiment, if the number of one or more and LA is two or more.

0016COP 11-12 is mounted to the COP dedicated slots S91-S92, and LA 21-26 is mounted to

the slots S93-S98 for LA mounting. However, LA26 shall be used as the board for reserves here, a circuit shall not be connected, and it shall not be used in an initial stage. From each CCU board, it is connected to the backboard 81 as a bus for input and output, respectively. The bus from each board is outputted and inputted in the matrix switch circuit 31 in the backboard 81, and switching of a bus is performed in this matrix switch circuit 31. Switching of a bus performs the bus from some COP dedicated slots S91-S92, and the bus connection to some LA dedicated slots S93-S98, and the connection is made by the switch control circuit 41 in the backboard 81. The switch control circuit 41 can also check the connected state of the matrix switch circuit 31, and can notify the host 61 of a switching state depending on the demand from the host 61. In initial setting, a switching demand is performed from the host 61 to the switch control circuit 41, and the switch control circuit 41 switches to the matrix switch circuit 31.

0017The matrix switch circuit 31 consists of a relay switch, a MOS switch of a solid state switch, etc., and the switch control circuit 41 is connected to the control terminal of each switch here, and with the control signal from a host. The connected state of said matrix switch circuit 31 can be appropriately changed via the switch control circuit 41.

0018As this embodiment, as the combination of COP11 (S91)-COP12 (S92), and LA21 (S93)-LA26 (S98) is shown, for example in drawing 2 with the gestalt of arborescence. To COP11 from the host 61, it is possible to connect LA 24-25 to connection and COP12, and LA26 makes LA 21-23 a reserve in this example.

0019The block diagram of the matrix switch circuit 31 on the backboard 81 is shown in drawing 3. In order to make a figure intelligible, COP 11-12 is shown perpendicularly, and it shows LA 21-26 horizontally, and shows the state where it was connected to the matrix switch, respectively. The matrix switch forms MOSFET of three terminals, the bipolar transistor, the relay, etc. at the cross point of the matrix, connects the control terminal to the switch control circuit 41, and the switch control circuit 41 controls the matrix switch circuit 31. If the switch control circuit 41 stores the high of voltage, and the low in the register or the flag for example, it is controlling it, it will monitor the state of the matrix switch circuit 31.

0020According to drawing 3, LA 24-25 is connected to LA 21-23 and COP12 the actual condition and COP11. To the matrix switch circuit 31, it carries out possible **of the connection on a lattice** by setting out from the switch control circuit 41. Here, a black dot shows a lattice-like connected part.

0021(2) Below explanation of operation explains per operation of this embodiment. Here, it explains using the flow chart of ***** drawing 4 of LA failure occurrence of operation. Here, the case where failure occurs is temporarily explained to LA23.

0022In Step T1, if failure usually occurs in LA, a certain phenomenon will occur. Next, in Step T2, if failure occurs in LA23, COP11 diagnoses to LA23, and an error will be made to the host 61 and it will notify him of the contents. In T3, a user checks the error content of LA of which the host was notified, and judges whether it is that to which the contents depend on failure of hardware. In Step T4, since exchange of the LA23 is needed when a user judges it as failure of LA23 here, it is checked whether it is usable in LA26 board for substitution already mounted in reserves. This check is a check of whether LA26 for reserves is already used for other COP. In this case, as a substitute of other LA failures, when LA26 is used, substitution already becomes impossible.

0023Next, in Step T5, if use of the alternative board of this LA26 is possible, a user will stop COP11 and that subordinate's operation of LA21-LA23 first. After a stop is completed, the cable for circuits connected to the circuit is removed from LA23, and the cable of the circuit 73 is connected to LA26. In T6, with software etc., a user separates connection of COP11 and LA23, and performs the connections set of COP11 and LA26. The switch control circuit 41 switches the contents set up there to the matrix switch circuit 31. If switching is completed, a user will start operation of COP11 and the subordinate's LA 21-22, and 26.

0024By the above-mentioned embodiment, when failure occurred in LA23, COP11 detected the failure and the example of which the host 61 is notified was shown, but it may be set as the program target which scans **whether each LA in a device broke down, and** to LA by COP11 for every constant interval. A constant interval is made into 1 or less second, and if it judges that the LA is out of order and the host 61 is notified when the scan also sends out an acknowledge signal to each LA and does not have the answer, it can switch to surplus LA for failure at an early stage, rather than switching, after LA breaks down. Since failure is detectable in the state whether failure occurs or not, early convalescence of the data communications of a circuit can be planned.

0025A 2nd embodiment Next, a 2nd embodiment of this invention is described with

reference to drawings.

0026Reference of drawing 5 forms the monitor 102 out of the monitoring circuit 101 and the cage 51 on the backboard 81. In order to know the switching state of a communication control unit (CCU), had to check from the host 61 specially, but. It becomes possible by inputting the output signal from the switch control circuit 41 into the monitoring circuit 101, and displaying it by the monitor 102 to always check a switch state.

0027COP11, LA21, LA22, and LA23 are connected so that the switch control circuit 41 may be shown in the state of the matrix switch circuit 31, for example, drawing 3, Since it can recognize having connected COP12, LA24, and LA25 with the service voltage to control terminals, such as MOSFET provided at the cross point of the matrix switch circuit 31, That service voltage is stored in the register etc. which are built in separately in the bit of "0" and "1", the state of a register equivalent to this state where it is connected is read, and the state of each cross point is outputted to the monitoring circuit 101.

0028The monitoring circuit 101 has an image processing function, and generates the pattern which can express the state of a matrix switch itself in a picture as a picture signal, It generates in the similar manner as a picture signal which displays the switch of the point that LA21 and LA22 to COP11 and COP12, and LA26 cross, with ON-and-OFF numerals. Or it is good also as a display which distinguished the line which makes a thick line the line through which it flows in the matrix form voice of X-Y, and has not flowed through it as a small-gage wire. The monitor 102 consists of a cathode-ray tube, a liquid crystal panel, and a display panel as which any of a plasma display panel may be sufficient, expresses the picture signal generated in the monitoring circuit 101, and enables it to recognize visually the switch/on/off state of the matrix switch circuit 31. The light may be switched on in spot and the change state which can be visually recognized whenever it changes under control of the matrix switch circuit 31 of the switch control circuit 41 may be displayed.

0029The output signal from the switch control circuit 41 may be a control signal from the host 61, or may be a signal which is pointing to the matrix form voice of the matrix switch circuit 31 from the switch control circuit 41.

0030In addition to the effect of a 1st embodiment, this embodiment has the effect that the switching state of a communication control unit (CCU) can be checked visually, without using the host 61.

Brief Description of the Drawings

Drawing 1It is a block diagram of the communication control unit by this invention.

Drawing 2It is an arborescence lineblock diagram in the communication control unit by this invention.

Drawing 3It is a matrix switch circuit diagram of the communication control unit by this invention.

Drawing 4It is an operation flow chart of the communication control unit by this invention.

Drawing 5It is a block diagram of the communication control unit by this invention.

Drawing 6It is a block diagram of the conventional communication control unit.

Drawing 7It is a concrete wiring constitution figure of the conventional communication control unit.

Description of Notations

11 and 12 Control processor (COP)

21-26 Line adapter (LA)

31 Matrix switch circuit

41 Switch control circuit

51 Cage

61 Host

81 Backboard

Drawing 2

For drawings please refer to the original document.

Drawing 7

For drawings please refer to the original document.

Drawing 1

For drawings please refer to the original document.

Drawing 3

For drawings please refer to the original document.

Drawing 4

For drawings please refer to the original document.

Drawing 5

For drawings please refer to the original document.

Drawing 6

For drawings please refer to the original document.

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For drawings please refer to the original document.

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